# STATUS OF GYPSY MOTH POPULATIONS AT PATUXENT RIVER NAVAL AIR STATION, INDIAN HEAD NAVAL ORDNANCE STATION, AND NATIONAL NAVAL MEDICAL CENTER (BETHESDA)

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Morgantown, WV

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# STATUS OF GYPSY MOTH POPULATIONS AT PATUXENT RIVER NAVAL AIR STATION, INDIAN HEAD NAVAL ORDNANCE STATION, AND NATIONAL NAVAL MEDICAL CENTER (BETHESDA)


## ABSTRACT

Egg mass surveys conducted in November 1988 revealed 930 egg masses per acre at the National Naval Medical Center and only 1 egg mass at both Indian Head Naval Ordnance Station and Patuxent River Naval Air Station. Gypsy moth populations are sufficient to cause noticeable defoliation at the National Naval Medical Center in 1989. Treatment is recommended.


## INTRODUCTION

The USDA Forest Service began monitoring gypsy moth population levels at the National Naval Medical Center (Bethesda), Indian Head Naval Ordnance Station, and Patuxent River Naval Air Station in 1982. That year egg mass surveys revealed only 2 egg masses at the National Naval Medical Center and none at both Indian Head Naval Ordnance Station and Patuxent River Naval Air Station. Egg mass surveys conducted periodically from 1983 to 1987 revealed low level populations of gypsy moth. Aerial defoliation surveys have been conducted on a yearly basis and no defoliation has been detected.

On November 14, 16 and 17, 1988, USDA Forest Service personnel conducted gypsy moth egg mass surveys at Patuxent River Naval Air Station, Indian Head Naval Ordnance Station and the National Naval Medical Center (Bethesda). The purpose of these surveys was to determine the status of gypsy moth populations on these Naval sites within the Chesapeake Division and determine if intervention tactics are necessary in 1989.

## METHODS

Gypsy moth survey plots were randomly selected based on available host trees (oaks), size of sample areas, uniformity between egg mass counts, areas of concern to facility personnel, and available time. At each sample point, a 5-minute walk was conducted.

The 5-minute walk method consisted of 2 observers casually walking in the same direction from the same starting point within the survey area for a period of 5 minutes. The number of new egg masses observed was then averaged and the number of egg masses per acre determined as follows:

$$Y = 20.56X + 14.58^{1/}$$

where,

Y = egg masses per acre

X = average number of egg masses observed during the 5-minute walk

## RESULTS

### Patuxent River Naval Air Station

A total of 18 survey plots was established at Patuxent River Naval Air Station (Figure 1). Table 1 presents the egg mass survey results for each survey point. A single egg mass was detected at only one survey point. This represents an estimated 35 egg masses per acre for a site-wide average of 2 egg masses per acre.

### Indian Head Naval Ordnance Station

A total of 19 survey plots was established at Indian Head Naval Ordnance Station (Figure 2). Table 2 presents the egg mass survey results for each survey point. A single egg mass was detected at only one survey point. This represents an estimated 35 egg masses per acre for a site-wide average of 2 egg masses per acre.

### National Naval Medical Center (Bethesda)

A total of 12 survey plots was established at the National Naval Medical Center at Bethesda (Figure 3). Table 3 presents the egg mass survey results for each survey point. Egg masses were detected at each survey point location. Egg mass densities throughout the National Naval Medical Center ranged from 240-1942 and averaged 930 egg masses per acre.

## DISCUSSION

The gypsy moth is subject to physical and biological factors that help to regulate the population. The availability and suitability of food, site conditions, incidence of natural control factors (predators and parasites), inter- and intra-specific competition, weather effects, as well as many other factors cannot be predicted at this time. The basic guidelines used to predict the degree of defoliation include evaluation of the past defoliation history of the area in question, number of egg masses/acre, size and condition of the egg masses, available preferred food, terrain and risk of larval blow-in following egg hatch. Potential defoliation is categorized as follows: light (1-30 percent); moderate (31-60 percent); and heavy/severe (61-100 percent).

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1/ Eggen, D.A., and L.P. Abrahamson. 1983. Estimating Gypsy Moth Egg Mass Densities. State Univ. of NY, Coll. of Env. Sci. and Forestry, School of Forestry. Misc. Publ. No. 1 (ESF 80-002). 30p.

The survey results indicate that gypsy moth populations are sufficiently high enough to cause moderate to heavy defoliation (31-100 percent) at the National Naval Medical Center. Defoliation is not likely to occur at Patuxent River Naval Air Station and Indian Head Naval Ordnance Station in 1989.

Three management options have been evaluated for managing gypsy moth populations at these Navy activities. These options are offered based upon the following objectives: 1) protecting host tree foliage; 2) preventing tree mortality; and 3) reducing gypsy moth populations. Each is discussed below.

No Action Option

It is possible that gypsy moth populations could collapse of their own accord due to the presence of NPV (nucleopolyhedrosis virus). However, it is not possible to accurately assess the likelihood of such an event with the information on hand. In areas with defoliating level gypsy moth populations (greater than 250 egg masses per acre) viral epizootics generally manifest themselves after significant tree defoliation has already occurred. In areas where defoliation occurs, but where the trees do not need to refoliate, there probably is not any significant impact on the trees. At worst, there may be a reduction in the rate of growth during that season. However, in areas that are heavily defoliated, and where the trees must expend valuable energy resources to refoliate, the stage is set for significant impacts (branch dieback and mortality) depending upon tree condition at the time of defoliation.

Trees at greatest risk are those that are presently stressed from other factors, such as: 1) soil compaction from sidewalks, parking lots, machinery and/or heavy foot travel; 2) overmaturity; 3) drought; 4) shock due to recent harvest exposures; and 5) other insect or disease related problems.

Chemical Insecticide Option

The second option is to use a chemical insecticide to control gypsy moth populations. Dimilin® (diflubenzuron) is the most widely used chemical insecticide in State-supported gypsy moth suppression projects in the Northeast. Diflubenzuron is an insect growth regulator that disrupts the normal molting processes of immature larvae. The mode of action is to inhibit the formation of chitin, a necessary component of the outer cuticle which causes the affected larvae to die during the molt following treatment. The method of uptake is primarily by ingestion, however, recent research has indicated the possibility of absorption through the cuticle as well.

Dimilin is registered by EPA for use in residential areas. It is, however, extremely toxic to aquatic invertebrates, and should not be applied to water or wetlands. Dimilin is available as a 25 percent wettable powder formulation, and the recommended application rate is 1-4 ounces per acre applied in one treatment. With proper application, foliage protection and population reduction of at least 90 percent can be expected.

## Microbial Insecticide Option

The third option is to use a microbial insecticide to manage gypsy moth populations. The only biological insecticide currently available for gypsy moth control is a microbial insecticide based on the bacterium Bacillus thuringiensis variety kurstaki. This insecticide is available by a variety of manufacturers and has been used extensively in Federal and State-sponsored suppression projects throughout the Northeast in both forested and residential areas. B.t. acts specifically against lepidopterous larvae as a stomach poison and therefore must be ingested. The major mode of action is by mid-gut paralysis which occurs soon after feeding. This results in a cessation of feeding, and death by starvation.

B.t. formulations are available as flowable concentrates, wettable powders, and emulsifiable suspensions. The normal application rates range from 12-20 BIUs per acre in each of one or more treatments. With proper application, foliage protection and population reductions of about 70 percent can be expected.

## Alternatives

With the previously described options in mind, the following 7 alternatives have been developed.

Alternative 1. -- No action.

Alternative 2. -- Single application of Dimilin applied aerially at the rate of 2 ounces (formulated material) in 128 ounces of water per acre.

Alternative 3. -- Ground application of Dimilin at the same rate as that discussed in Alternative 2, but diluted such that the total mixture applied provides adequate coverage of the foliage without excessive runoff.

Alternative 4. -- A single aerial application of B.t. applied at the rate of 12-20 BIUs per acre in 96 to 128 ounces per acre total mix. An appropriate spreader/sticker should be added at the rate of 2 percent by volume.

Alternative 5. -- Two aerial applications of B.t. at the same rate as that discussed in Alternative 4. The second application should be applied 7-10 days following the first.

Alternative 6. -- Ground applications of B.t. at the same rate as that in Alternatives 4 and 5, but diluted such that the total amount applied provides adequate coverage of tree foliage without excessive runoff.

Alternative 7. -- Same as Alternative 6, except two applications are made; the second 7-10 days following the first.

## RECOMMENDATIONS BY SITE

### Patuxent River Naval Air Station

The survey results suggest that defoliation is not likely to occur in 1989. Our recommendation for this Naval site is to implement Alternative 1, i.e. take no action.

### Indian Head Naval Ordnance Station

The survey results suggest that little, if any, defoliation will occur in 1989. Our recommendation for this Naval site is to implement Alternative 1, i.e. take no action.

### National Naval Medical Center (Bethesda)

Gypsy moth egg mass counts indicate that moderate to heavy defoliation could occur at this site in 1989. If this is unacceptable, the most effective alternative to implement is Alternative 2. If streams or ponds exist in the proposed treatment area, Alternative 5 would provide adequate effectiveness while minimizing the impact on nontarget aquatic organisms. Alternative 4 would likely provide foliage protection only.

If aerial applications cannot be accomplished, foliage protection could be achieved in areas accessible by ground spraying equipment. Significant population reduction should not be expected however, and the need for retreatment the following year would be likely. With this in mind, our recommendation for ground applications would be (in order of effectiveness):

Alternatives 3, 7 or 6.

Table 1.-- Egg Mass Counts at Each Survey Point Location at Patuxent River Naval Air Station, November 16, 1988.

| Plot Number | Egg Masses/Acre |
|---|---|
| 1 | 0 |
| 2 | 0 |
| 3 | 35 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 0 |
| 13 | 0 |
| 14 | 0 |
| 15 | 0 |
| 16 | 0 |
| 17 | 0 |
| 18 | 0 |

Average = 2 egg masses/acre
Range = 0-35 egg masses/acre

Table 2.-- Egg Mass Counts at Each Survey Point Location at Indian Head Naval Ordnance Station, November 17, 1988.

| Plot Number | Egg Masses/Acre |
|---|---|
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 0 |
| 13 | 0 |
| 14 | 0 |
| 15 | 0 |
| 16 | 0 |
| 17 | 0 |
| 18 | 35 |
| 19 | 0 |

Average = 2 egg masses per acre
Range = 0-35 egg masses per acre

Table 3.-- Egg Mass Counts at Each Survey Point Location at the National Naval Medical Center, November 14, 1988.

| Plot Number | Egg Masses/Acre |
|---|---|
| 1 | 1429 |
| 2 | 404 |
| 3 | 609 |
| 4 | 1942 |
| 5 | 240 |
| 6 | 343 |
| 7 | 671 |
| 8 | 1306 |
| 9 | 1163 |
| 10 | 917 |
| 11 | 835 |
| 12 | 1306 |

Average = 930 egg masses per acre
Range = 240-1942 egg masses per acre

United States Department of Agriculture | Forest Service | Northeastern Area State and Private Forestry | 180 Canfield St. Morgantown, WV 26505

Reply To: 3460

Date: December 1, 1988

Mr. Dwight Fielder
Staff Forester, Code 2432
Naval Facilities Engineering Command
Washington Navy Yard
Washington, DC 20374

Dear Dwight:

Enclosed for your information are the results of our gypsy moth biological evaluations conducted at Patuxent River Naval Air Station, Indian Head Naval Ordnance Station and the National Naval Medical Center (Bethesda). In summary, gypsy moth populations are sufficient to cause moderate-heavy defoliation (31-100 percent) at the National Naval Medical Center. We do not anticipate any defoliation at Patuxent River or Indian Head.

The report presents some treatment options and alternatives based on the following management objectives: 1) protecting host tree foliage; 2) preventing tree mortality; and 3) reducing gypsy moth populations. In the report, we recommend application of B.t. or Dimilin at the National Naval Medical Center.

Call Rod Whiteman or me at 304-291-4133 if you have any questions regarding the survey results or treatment options. We will be happy to work with you to accommodate your treatment plans.

Sincerely,

Rodney L. Whiteman

for NOEL F. SCHNEEBERGER
Entomologist
Forest Pest Management

Enc.
cc: AO
Kevin Odens
Rich LeClerc
Kyle Rambo
Betsie Handley
Sally Hughes

RLW/NFS/mae

# PATUXENT RIVER

# NAVAL AIR STATION

Figure 1.--Gypsy Moth Egg Mass Survey Plot Locations, Patuxent River Naval Air Station, November 16,1988.